Express Mail Label No. EV 420 566 175 US

Date of Mailing: March 10, 2004

PATENT
Case No. GP-304358
(2760/160)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR UNITED STATES LETTERS PATENT

INVENTOR(S): DAVID W. ROCKETT
GARY A. WATKINS

TITLE: METHOD AND SYSTEM FOR AUTOMATED UNIT SERVICE REQUESTS FROM A TELEMATICS UNIT

ATTORNEYS: ANTHONY LUKE SIMON, ESQ.
GENERAL MOTORS CORPORATION
LEGAL STAFF
MAIL CODE: 482-C23-B21
300 RENAISSANCE CENTER
P.O. BOX 300
DETROIT, MICHIGAN 48265-3000
(313) 665-4714

METHOD AND SYSTEM FOR AUTOMATED UNIT SERVICE REQUESTS FROM A TELEMATICS UNIT

FIELD OF THE INVENTION

This invention relates generally to telematics systems. In particular, the invention relates to a method and system for automated unit service requests from a telematics unit.

BACKGROUND OF THE INVENTION

One of the fastest growing areas of communications technology is related to automobile network solutions. The demand and potential for wireless vehicle communication, networking and diagnostic services have recently increased. Although many vehicles on the road today have limited wireless communication functions, such as unlocking a door and setting or disabling a car alarm, new vehicles offer additional wireless communication systems that help personalize comfort settings, run maintenance and diagnostic functions, place telephone calls, access call-center information, update controller systems, determine vehicle location, assist in tracking vehicle after a theft of the vehicle and provide other vehicle-related services.

A telematics unit installed in a vehicle facilitates communications to and from the vehicle. Drivers can call telematics call centers and receive navigational, concierge, emergency, and location services, as well as other specialized help such as locating the geographical position of a stolen vehicle and honking the horn of a vehicle when the vehicle cannot be located in a large parking garage. Vehicle information is uploaded to a call center through the telematics unit. Telematics service providers can offer enhanced telematics services by supplying a subscriber with a digital handset. The telematics unit must be configured to activate and personalize these various services.

A vehicle is sold with a factory-installed telematics unit. Once the vehicle leaves a dealership the subscriber is enrolled in the telematics system database and the system is activated. The dealer calls a telematics call center using the telematics system to provide data regarding the subscriber to a communication service advisor at the telematics call center. This data is used to personalize the telematics services. The dealer must also provide details as to the telematics services desired by the subscriber to the communication service advisor in a time consuming interaction.

Alternately the telematics service is personalized after leaving the dealership. The subscriber calls the telematics call center using the telematics system to provide data to a communication service advisor at the telematics call center. The subscriber must inform the communication service advisor which telematics services they want in their subscription package during a time consuming interaction with the communication service advisor.

Information needed to personalize the personal calling feature of the telematics unit is obtained from a third party wireless provider. This information is not always available when a dealer or subscriber calls the call center to personalize the telematics service. If the information is not available, the dealer or subscriber must call the call center at a later time or the call center must make an outbound attempt to personalize the telematics unit.

It is desirable therefore, to provide a method and system for automated unit service requests from a telematics unit, that overcomes the challenges and obstacles described above.

SUMMARY OF THE INVENTION

The invention provides a method for automated unit service requests from a telematics unit. A unit request call trigger is set at the telematics unit from a call center. A unit request call is received based on the unit request call trigger. The telematics unit is configured in response to the received unit request call.

Another aspect of the invention provides a computer usable medium including computer program for automated unit service requests from a telematics unit. The computer usable medium comprises: computer program code for setting a unit request call trigger at the telematics unit from a call center; computer program code for receiving a unit request call based on the unit request call trigger; and computer program code for configuring the telematics unit in response to the received unit request call.

Another aspect of the invention provides a system for automated unit service requests from a telematics unit. The system comprises: means for setting a unit request call trigger at the telematics unit from a call center; means for receiving a unit request call based on the unit request call trigger; and means for configuring the telematics unit in response to the received unit request call.

The aforementioned and other features and advantages of the invention will become further apparent from the following detailed description of the presently preferred embodiment, read in conjunction with the accompanying drawings. The detailed description and drawings are merely illustrative of the invention rather than limiting, the scope of the invention being defined by the appended claims and equivalents thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram of a system for automated unit service requests from a telematics unit in accordance with one embodiment of the current invention;

FIG. 2 is a flow diagram of a method for automated unit service requests from a telematics unit in accordance with one embodiment of the current invention; and

FIG. 3 is a flow diagram detailing the step of configuring the telematics unit at block **270** of **FIG. 2**.

DETAILED DESCRIPTION OF THE
PRESENTLY PREFERRED EMBODIMENTS

FIG. 1 is a schematic diagram of a system for automated unit service requests from a telematics unit in accordance with one embodiment of the current invention. The system for establishing a telephony data connection to a receiver at **100** comprises: a mobile vehicle **110**, a telematics unit **120**, one or more wireless carrier systems **140**, or one or more satellite carrier systems **141**, one or more communication networks **142**, and one or more call centers **180**. Mobile vehicle **110** is a vehicle such as a car or truck equipped with suitable hardware and software for transmitting and receiving speech and data communications.

In one embodiment of the invention, telematics unit comprises: a digital signal processor (DSP) **122** connected to a wireless modem **124**; a global positioning system (GPS) receiver or GPS unit **126**; an in-vehicle memory **128**; a microphone **130**; one or more speakers **132**; an embedded or in-vehicle phone **134** or an email access appliance **136**; and a display **138**. DSP **122** is also referred to as a microcontroller, controller, host processor, ASIC, or vehicle communications processor. GPS unit **126** provides longitude and latitude

coordinates of the vehicle, as well as a time stamp and a date stamp. In-vehicle phone **134** is an analog, digital, dual-mode, dual-band, multi-mode or multi-band cellular phone.

Telematics unit **120** can store GPS location data and other data files in in-vehicle memory **128**. Telematics unit **120** can set or reset calling-state indicators and can enable or disable various cellular-phone functions, telematics-unit functions and vehicle functions when directed by program code running on DSP **122**. Telematics unit **120** can send and receive over-the-air messages using, for example, a pseudo-standard air-interface function or other proprietary and non-proprietary communication links.

DSP **122** executes various computer programs and computer program code, within telematics unit **120**, which interact with electronic and mechanical systems. DSP **122** affects communications between telematics unit **120**, wireless carrier system **140** or satellite carrier system **141** communications network **142** and call center **180**. A speech-recognition engine **119**, which can translate human speech input through microphone **130** to digital signals used to control functions of telematics unit, is installed in telematics unit **120**. The interface to telematics unit **120** includes one or more buttons (not shown) on telematics unit **120**, or on an associated keyboard or keypad that are also used to control functions of telematics unit **120**. A text to speech synthesizer **121** can convert text strings to audible messages that are played through speaker **132** of telematics unit **120**.

Speech recognition engine **119** and buttons are used to activate and control various functions of telematics unit **120**, such as placing personal calls, contacting a communication services advisor **185**, or requesting emergency services. In another embodiment, the interface to telematics unit **120** includes other forms of preference and data entry including touch-screens, wired or wireless keypad remotes, or other wirelessly connected devices such as Bluetooth-enabled devices or 802.11-enabled devices.

DSP **122** controls, generates and accepts digital signals transmitted between telematics unit **120** and a vehicle communication bus **112** that is connected to various vehicle components **114**, vehicle devices **115**, and various sensors **116** in mobile vehicle **110**. DSP **122** can activate various programming and operation modes, as well as provide for data transfers. In facilitating interactions among the various communication and electronic modules, vehicle communication bus **112** utilizes bus interfaces such as controller-area network (CAN), J1850, International Organization for Standardization (ISO) Standard 9141, ISO Standard 11898 for high-speed applications, and ISO Standard 11519 for lower speed applications.

Mobile vehicle **110** via telematics unit **120** sends and receives radio transmissions from wireless carrier system **140**, or satellite carrier system **141**. Wireless carrier system **140**, or satellite carrier system **141** is any suitable system for transmitting a signal from mobile vehicle **110** to communication network **142**.

Communication network **142** includes services from mobile telephone switching offices, wireless networks, public-switched telephone networks (PSTN), and Internet protocol (IP) networks. Communication network **142** comprises a wired network, an optical network, a fiber network, another wireless network, or any combination thereof. Communication network **142** connects to mobile vehicle **110** via wireless carrier system **140**, or satellite carrier system **141**.

Communication network **142** can send and receive short messages according to established protocols such as dedicated short range communication standard (DSRC), IS-637 standards for short message service (SMS), IS-136 air-interface standards for SMS, and GSM 03.40 and 09.02 standards. In one embodiment of the invention, similar to paging, an SMS communication is posted along with an intended recipient, such as a communication device in mobile vehicle **110**.

Call center **180** is a location where many calls are received and serviced at the same time, or where many calls are sent at the same time. In one embodiment of the invention, the call center is a telematics call center, facilitating communications to and from telematics unit **120** in mobile vehicle **110**. In another embodiment, the call center **180** is a voice call center, providing verbal communications between a communication service advisor **185**, in call center **180** and a subscriber. In another embodiment, call center **180** contains each of these functions. In another embodiment, call center **180** operates in a fully automated fashion.

Communication services advisor **185** is a real advisor or a virtual advisor. A real advisor is a human being in verbal communication with a user or subscriber. A virtual advisor is a synthesized speech interface responding to requests from user or subscriber. In one embodiment, the virtual advisor includes one or more recorded messages. In another embodiment, the virtual advisor generates speech messages using a call center based text to speech synthesizer (TTS). In another embodiment, the virtual advisor includes both recorded and TTS generated messages.

Call center **180** provides services to telematics unit **120**. Call center **180** sets unit request call triggers at telematics unit **120**, receives a unit request call from telematics unit **120** and configures the telematics unit **120** upon receiving the unit request call. Configurations performed include base configuration and personal calling configuration. Call center **180** also receives subscriber service calls, determines if telematics unit **120** is data upload capable, and configures telematics unit **120** to initiate a unit request call at a predetermined time. Call center **180** determines available enrollment data, such as a customer data record or a personal calling number, and configures the unit request call trigger based on the available enrollment data. Data upload is comprised of transferring data from a telematics unit to a remote facility initiated by a trigger, and alternatively transferring data from a remote facility to a telematics unit based on a trigger. In

one embodiment, a trigger is a condition detected to activate a function based on a logical, physical or temporal event. Examples of possible trigger conditions include an accumulated count of ignition cycles or a predetermined time and date.

Call center **180** can receive data from telematics unit **120**, through wireless carrier system **140**, satellite carrier systems **141**, and communication network **142**. Call center **180** can determine mobile identification numbers (MINs) and telematics unit identifiers associated with a telematics unit access request, compare MINs and telematics unit identifiers with a database of identifier records, and send calling-state messages to the telematics unit **120** based on the request and identification numbers. A MIN may also be referred to as a personal calling number.

Communication network **142** connects wireless carrier system **140** or satellite carrier system **141** to a user computer **150**, a wireless or wired phone **160**, a handheld device **170**, such as a personal digital assistant, and call center **180**. User computer **150** or handheld device **170** has a wireless modem to send data through wireless carrier system **140**, or satellite carrier system **141,** which connects to communication network **142**. In another embodiment, user computer **150** or handheld device **170** has a wired modem that connects to communications network **142**. Data is received at call center **180**. Call center **180** has any suitable hardware and software capable of providing web services to help transmit messages and data signals from user computer **150** or handheld device **170** to telematics unit **120** in mobile vehicle **110**.

FIG. 2 is a flow diagram of a method for automated unit service requests from a telematics unit in accordance with one embodiment of the current invention. In one embodiment, the automated unit service request method is a method used for telematics service enrollment wherein the services requested by the telematics subscriber are configured and activated. The method for automated unit service requests from a telematics unit at **200** begins (block **205**)

when a subscriber service call is received at a call center (block **210**). Prior to the standard enrollment automation process making an outbound attempt to configure the telematics unit, the subscriber service call is received. The telematics unit is configured to activate and customize the telematics service features requested by the subscriber. Such features include, but are not limited to basic telematics service and security telematics service. The configuration process includes transmission of instructions from the telematics call center **180** to the telematics unit **120**, which set the hardware of the installed telematics unit **120** to provide the requested service features.

The call center determines an available enrollment data. In this step of the method, the call center determines if a customer database record is expected (block **220**). If a customer database record is not expected, the call center advisor must proceed with a full configuration (block **225**). Since no data is available to determine what telematics service features have been requested by the subscriber, the call center advisor must obtain that information in a dialogue with the subscriber. Full configuration requires the subscriber maintain that dialogue with the call center advisor until telematics service enrollment is complete. Once full configuration is complete, the call center advisor provides the service requested by the subscriber (block **280**), the subscriber call terminates (block **290**) and the method ends (block **295**).

If a customer database record is expected, the call center advisor requests a limited set of information from the subscriber, comprising the subscriber's name, phone number, personal identification number and zip code (block **230**). This information verifies the subscriber's identity and allows the call center to determine if personal calling is available.

The call center advisor makes a determination if the telematics unit is data upload capable (block **240**). If the telematics unit is not data upload capable, the call center advisor must proceed with a full configuration (block **225**) since completing the inbound automated configuration of the telematics unit requires a data upload capable telematics unit. The call center provides the service requested by the subscriber (block **280**), the subscriber call terminates (block **290**) and the method ends (block **295**).

If the telematics unit is data upload capable, the call center sets a unit request call trigger that utilizes the data upload capability (block **250**). Setting the unit request call trigger requires configuration of data upload. The data upload configuration sets data upload parameters to allow the vehicle to place an inbound automated configuration call. The unit request call trigger instructs the telematics unit to initiate a unit request call at a predetermined future time, such as 10 minutes after the subscriber service call ends. By setting the unit request call trigger, the call center can determine the available enrollment data and provide time for the call center to obtain all necessary enrollment data. The call center provides the service requested by the subscriber before terminating the subscriber call (block **255**).

At the predetermined time, the unit request call trigger initiates a unit request call, which is received at the call center (block **260**). The call center can receive a carrier response to a generated unit request call. The carrier response comprises data regarding the service status of the unit request call. When the telematics unit generates the unit request call, the service status of the generated request call is unknown. The service status comprises data indicating the level of success or failure of the unit request call including why a request was not properly serviced. The carrier response is maintained in a database where the semantics of the data contained therein is determined. The resulting semantic interpretation of the data contained in the carrier response can be used to influence the trigger criteria and generation of subsequent unit requests. Upon

receiving the unit request call, the call center configures the telematics unit (block **270**), the unit request call terminates (block **292**), and the method ends (block **295**). Setting the unit request call trigger, the unit request call, and configuration of the telematics unit occurs without subscriber involvement.

FIG. 3 is a flow diagram detailing the step of configuring the telematics unit at block **270** of **FIG. 2**. The step of configuring the telematics unit at **300** begins (block **305**) with the call center determining available enrollment data (block **310**). The call center determines if personal calling is available (block **320**). Personal calling is cell phone service provided by the telematics service provider through a wireless provider. If personal calling is not available the call center waits to receive the unit request call (block **325**). When the unit request call is received the call center performs a base configuration (block **330**). The base configuration configures the telematics unit with the features requested by the subscriber and the unit request call ends (block **395**).

If personal calling is available the call center requests a personal calling number from a wireless provider (block **340**). The personal calling number may or may not be available prior to the unit request call (block **342**). If the personal calling number is available prior to the unit request call, the call center waits to receive the unit request call (block **345**). When the unit request call is received the call center performs a base configuration and a personal calling configuration (block **350**). The personal calling configuration configures the subscriber cell phone with the personal calling number assigned by the wireless provider and the unit request call ends (block **395**).

If the personal calling number is not available prior to the unit request call, the call center waits to receive the unit request call (block **355**). When the unit request call is received the call center performs the base configuration only (block **360**) and resets the unit request call trigger to initiate another unit request call at a predetermined future time, such as 48 hours after the current unit request call ends (block **362**). The call center waits to receive the unit request

call (block **365**). When the unit request call is received the call center determines if the personal calling number is available (block **370**). If the personal calling number is available (block **370**), personal calling configuration is performed (block **375**) and the step ends (block **395**). If the personal calling number is not available, the call center resets the unit request call trigger to initiate another unit request call at a predetermined future time (block **362**). The next unit request call occurs, for example, 48 hours after the current unit request call ends. The call center waits to receive the unit request call (block **365**). This loop repeats until the personal calling number is available and the personal calling configuration is performed (block **375**), at which time the step ends (block **395**). Upon completion of the automated inbound configuration method, the telematics unit is fully configured and telematics service enrollment is complete.

In one embodiment, the unit request call trigger, as in block **362**, is set for a predetermined time based on a carrier response. In such embodiment, the carrier response may indicate, for example, that the MIN is unavailable and the unit request call trigger will be set for a time when the MIN is estimated to be available. In another example, the carrier response may indicate that a manual activation market is needed, and the unit request call trigger will be set accordingly. Those of ordinary skill in the art are acquainted with carrier responses, and reasons for failure to obtain a MIN. Thus, receiving a carrier response to a generated unit request call, wherein the carrier response indicates MIN availability; results in resetting the unit request call trigger responsive to the carrier response.

While embodiments of the invention disclosed herein are presently considered to be preferred, various changes and modifications can be made without departing from the spirit and scope of the invention. The scope of the invention is indicated in the appended claims, and all changes that come within the meaning and range of equivalents are intended to be embraced therein.